Appendix 6-A (Energy Chapter)
Supplemental Resource and Energy Conservation Information

Table 6-A.1 Ink Consumption for All Performance Demonstration Sites

Substrate	Site	Ink (lbs)					Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Solvent-based ink							
LDPE, PE/EVA	5	14.8	18.8	26.6	23.1	19.1	102.4
	7	13.3	12.5	32.1	11.1	13.9	82.9
OPP	9B	4.8	5.2	47.7	5.0	3.3	66.0
	10	13.9	16.4	43.2	13.8	14.9	102.2
Water-based ink							
LDPE, PE/EVA	2	15.3	19.1	29.0	10.3	11.8	85.5
	3	10.6	10.0	29.9	4.8	3.3	58.6
OPP	1	11.4	8.6	56.5	2.7	2.6	81.8
	4	13.1	11.1	56.4	6.6	6.8	94.0
	9A	2.7	2.7	23.7	2.4	2.3	33.8
UV-cured ink							
LDPE, PE/EVA	6	8.8	4.6	20.4	3.6	5.8	43.2
LDPE	11	5.1	5.5	37.8	1.9	1.8	52.1
PE/EVA	8	1.1	1.0	3.6	0.8	0.6	7.1

[a]White ink was not printed on PE/EVA.

Table 6-A.2 Substrate Consumption for All Performance Demonstration Sites

Substrate	Site	Makeready (feet)			Finished (feet)			Total inc. mkrdy (ft)	Total not inc. mkrdy (ft)
		LDPE	PE/EVA	OPP	LDPE	PE/EVA	OPP		
Solvent-based ink									
LDPE, PE/EVA	5	1,933			21,924	20,852		44,709	42,776
	7	2,350			42,000	8,069		52,419	50,069
OPP	9B			1,930			33,641	35,571	33,641
	10			10,950			56,700	67,650	56,700
Water-based ink									
LDPE, PE/EVA	2	6,050	600		37,053	37,132		80,835	74,185
	3	4,220			26,297	47,884		78,401	74,181
OPP	1			11,892			51,000	62,892	51,000
	4			6,600			50,760	57,360	50,760
	9A			1,250			34,434	35,684	34,434
UV-cured ink									
LDPE, PE/EVA	6	3,964		650	32,432	27,261	6,583	70,890	66,276
LDPE	11	7,200			38,400			45,600	38,400
PE/EVA	8	800			2,559	15,912	4,265	23,536	22,736

Table 6-A.3 Ink and Ink Additive Consumption Rates for All Performance Demonstration Sites (per 6,000 Images)

Substrate	Site	Ink (lbs per 6,000 images)					Ink additives (lbs per 6,000 images)			Sub-total: ink (lbs per 6,000 images)	Sub-total: ink additives (lbs per 6,000 images)	Total (lbs per 6,000 images)
		Blue	Green	White[a]	Cyan	Magenta	Extender	Solvent	Other additives			
Solvent-based ink												
LDPE	5	2.64	3.36	8.94	4.13	3.42	0.00	2.73	0.00	22.49	2.73	25.22
	7	2.04	1.90	5.79	1.69	2.13	0.00	8.49	0.00	13.55	8.49	22.04
PE/EVA	5	2.64	3.36	0.00	4.13	3.42	0.00	1.79	0.00	13.55	1.79	15.34
	7	2.04	1.90	0.00	1.69	2.13	0.00	5.76	0.00	7.76	5.76	13.52
OPP	9B	1.08	1.16	10.60	1.12	0.74	0.32	1.60	0.00	14.70	1.92	16.62
	10	1.65	1.94	5.11	1.63	1.76	0.00	7.28	1.56	12.09	8.84	20.93
Water-based ink												
LDPE	2	1.52	1.89	5.38	1.02	1.17	0.00	0.14	0.18	10.98	0.32	11.30
	3	1.08	1.01	7.67	0.49	0.34	0.32	0.38	1.09	10.59	1.79	12.38
PE/EVA	2	1.52	1.89	0.00	1.02	1.17	0.00	0.06	0.13	5.60	0.19	5.79
	3	1.08	1.01	0.00	0.49	0.34	0.00	0.07	0.61	2.92	0.68	3.60
OPP	1	1.46	1.10	7.18	0.34	0.33	0.12	0.10	0.22	10.41	0.44	10.85
	4	1.82	1.55	7.86	0.92	0.94	0.28	0.04	0.00	13.09	0.32	13.41
	9A	0.61	0.61	5.31	0.53	0.52	0.17	0.36	0.02	7.58	0.55	8.13
UV-cured ink												
LDPE	6	0.99	0.52	3.74	0.41	0.64	0.00	0.00	0.00	6.30	0.00	6.30
	11	0.89	0.94	6.63	0.33	0.32	0.00	0.00	0.02	9.11	0.02	9.13
PE/EVA	6	0.99	0.52	0.00	0.41	0.64	0.00	0.00	0.00	2.56	0.00	2.56
	8	0.37	0.35	3.74	0.27	0.22	0.00	0.00	0.00	4.95	0.00	4.95

[a]White ink was not printed on PE/EVA.

Table 6-A.4 Ink and Ink Additive Consumption Rates for All Performance Demonstration Sites (per 6,000 Square Feet of Image)

Substrate	Site	Ink (lbs per 6,000 ft^2 of image)					Ink additives (lbs per 6,000 ft^2 of image)			Sub-total: ink (lbs per 6,000 ft^2 of image)	Sub-total: ink additives (lbs per 6,000 ft^2 of image)	Total (lbs per 6,000 ft^2 of image)
		Blue	Green	White[a]	Cyan	Magenta	Extender	Solvent	Other additives			
Solvent-based ink												
LDPE	5	1.19	1.51	4.02	1.86	1.54	0.00	1.23	0.00	10.12	1.23	11.35
	7	0.92	0.86	2.61	0.76	0.96	0.00	3.82	0.00	6.11	3.82	9.93
PE/EVA	5	1.19	1.51	0.00	1.86	1.54	0.00	0.81	0.00	6.10	0.81	6.91
	7	0.92	0.86	0.00	0.76	0.96	0.00	2.59	0.00	3.50	2.59	6.09
OPP	9B	0.49	0.52	4.77	0.50	0.34	0.15	0.72	0.00	6.62	0.87	7.49
	10	0.74	0.87	2.30	0.73	0.79	0.00	3.28	0.70	5.43	3.98	9.41
Water-based ink												
LDPE	2	0.68	0.85	2.42	0.46	0.52	0.00	0.06	0.09	4.93	0.15	5.08
	3	0.48	0.45	3.45	0.22	0.15	0.14	0.17	0.49	4.75	0.80	5.55
PE/EVA	2	0.68	0.85	0.00	0.46	0.52	0.00	0.03	0.05	2.51	0.08	2.59
	3	0.48	0.45	0.00	0.22	0.15	0.00	0.03	0.28	1.30	0.31	1.61
OPP	1	0.66	0.49	3.23	0.15	0.15	0.06	0.05	0.10	4.68	0.21	4.89
	4	0.82	0.70	3.54	0.41	0.42	0.13	0.02	0.00	5.89	0.15	6.04
	9A	0.27	0.27	2.39	0.24	0.23	0.08	0.16	0.01	3.40	0.25	3.65
UV-cured ink												
LDPE	6	0.45	0.23	1.68	0.18	0.29	0.00	0.00	0.00	2.83	0.00	2.83
	11	0.40	0.43	2.98	0.15	0.14	0.00	0.00	0.01	4.10	0.01	4.11
PE/EVA	6	0.45	0.23	0.00	0.18	0.29	0.00	0.00	0.00	1.15	0.00	1.15
	8	0.17	0.16	1.68	0.12	0.10	0.00	0.00	0.00	2.23	0.00	2.23

[a]White ink was not printed on PE/EVA.

Table 6-A.5 Solvent-based Ink and Ink Additive Consumption Rates (Additives per Color)

Substrate	Site	Component	Line colors						Process colors			
			Blue		Green		White[a]		Cyan		Magenta	
			lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image
LDPE, PE/EVA	5	ink	2.64	1.19	3.36	1.51	8.94	4.02	4.13	1.86	3.42	1.54
		solvent	0.61	0.27	0.30	0.13	0.94	0.42	0.62	0.28	0.27	0.12
		total	3.25	1.46	3.66	1.65	9.88	4.44	4.75	2.13	3.69	1.66
	7	ink	2.04	0.92	1.90	0.86	5.79	2.61	1.69	0.76	2.13	0.96
		solvent	1.46	0.66	1.53	0.69	2.72	1.23	1.21	0.55	1.56	0.70
		total	3.50	1.57	3.43	1.54	8.51	3.83	2.90	1.30	3.69	1.66
OPP	9B	ink	1.08	0.49	1.16	0.52	10.60	4.77	1.12	0.50	0.74	0.34
		extender	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.15
		solvent	0.28	0.13	0.55	0.25	0.14	0.06	0.26	0.12	0.37	0.17
		total	1.36	0.61	1.71	0.77	10.74	4.84	1.38	0.62	1.43	0.65
	10	ink	1.65	0.74	1.94	0.87	5.11	2.30	1.63	0.73	1.76	0.79
		solvent	1.18	0.53	1.29	0.58	2.58	1.16	0.65	0.29	1.58	0.71
		acetate	0.13	0.06	0.14	0.06	0.29	0.13	0.85	0.39	0.15	0.07
		total	2.96	1.33	3.37	1.52	7.98	3.59	3.13	1.41	3.49	1.57

[a]White ink was not printed on PE/EVA.

Table 6-A.6 Water-based Ink and Ink Additive Consumption Rates (Additives per Color)

Substrate	Site	Component	Line colors						Process colors			
			Blue		Green		White[a]		Cyan		Magenta	
			lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image	lbs per 6000 images	lbs per 6000 ft² of image
LDPE, PE/EVA	2	ink	1.52	0.68	1.89	0.85	5.38	2.40	1.02	0.46	1.17	0.53
		water	1.15	0.52	0.77	0.35	1.34	0.60	0.15	0.07	0.63	0.28
		solvent	0.04	0.02	0.02	0.01	0.08	0.04	0.00	0.00	0.00	0.00
		ammonia	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
		reducer	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
		cross-linker	0.02	0.01	0.03	0.02	0.04	0.02	0.01	0.01	0.02	0.01
		total	2.76	1.25	2.72	1.23	6.85	3.07	1.18	0.54	1.83	0.83
	3	ink	1.08	0.49	1.01	0.45	7.67	3.50	0.49	0.22	0.34	0.15
		water	0.00	0.00	0.00	0.00	0.48	0.22	0.00	0.00	0.00	0.00
		extender	0.00	0.00	0.00	0.00	0.32	0.14	0.00	0.00	0.00	0.00
		solvent	0.07	0.03	0.00	0.00	0.31	0.14	0.00	0.00	0.00	0.00
		ammonia	0.29	0.13	0.18	0.08	0.47	0.21	0.05	0.02	0.05	0.02
		cross-linker	0.03	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
		total	1.47	0.66	1.21	0.54	9.25	4.21	0.54	0.24	0.39	0.17
OPP	1	ink	1.46	0.66	1.10	0.49	7.18	3.20	0.34	0.15	0.33	0.15
		water	0.01	0.01	0.10	0.03	0.16	0.07	0.00	0.00	0.00	0.00
		extender	0.12	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		solvent	0.09	0.04	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00
		ammonia	0.00	0.00	0.03	0.02	0.14	0.06	0.00	0.00	0.00	0.00
		slow reducer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		defoamer	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
		total	1.68	0.77	1.23	0.54	7.53	3.35	0.34	0.15	0.33	0.15
	4	ink	1.82	0.82	1.55	0.70	7.86	3.54	0.92	0.41	0.94	0.42
		water	0.04	0.02	0.03	0.01	0.14	0.06	0.02	0.01	0.02	0.01
		extender	0.00	0.00	0.00	0.00	0.28	0.13	0.00	0.00	0.00	0.00
		solvent	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		wet out compound	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		total	1.89	0.85	1.59	0.71	8.28	3.73	0.94	0.42	0.96	0.43
	9A	ink	0.61	0.27	0.61	0.27	5.31	2.39	0.53	0.24	0.52	0.23
		water	0.00	0.00	0.00	0.00	0.37	0.17	0.00	0.00	0.00	0.00
		extender	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.08	0.00	0.00
		solvent	0.11	0.05	0.83	0.04	0.00	0.00	0.13	0.06	0.04	0.02
		defoamer	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
		total	0.72	0.32	1.44	0.31	5.69	2.56	0.83	0.38	0.56	0.25

[a]White ink was not printed on PE/EVA.

Table 6-A.7 UV-cured Ink and Ink Additive Consumption Rates (Additives per Color)

Substrate	Site	Component	Line colors						Process colors			
			Blue		Green		White[a]		Cyan		Magenta	
			lbs per 6000 images	lbs per 6000 ft^2 of image	lbs per 6000 images	lbs per 6000 ft^2 of image	lbs per 6000 images	lbs per 6000 ft^2 of image	lbs per 6000 images	lbs per 6000 ft^2 of image	lbs per 6000 images	lbs per 6000 ft^2 of image
LDPE, PE/EVA	6	ink	0.99	0.45	0.52	0.23	3.74	1.68	0.41	0.18	0.64	0.29
LDPE	11	ink	0.89	0.40	0.94	0.43	6.63	2.98	0.33	0.15	0.32	0.14
		low-viscosity monomer	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
		total	0.89	0.40	0.96	0.44	6.63	2.98	0.33	0.15	0.32	0.14
PE/EVA	8	ink	0.37	0.17	0.35	0.16	0.00	0.00	0.27	0.12	0.22	0.10

[a]White ink was not printed on PE/EVA.

Table 6-A.8 Ink and Additive Consumption for Water-based Ink on OPP at Site 1

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	35.90	32.80	45.70	24.70	24.90	164.00
	Water	0.40	2.90	2.00	0.20		5.50
	Extender	4.00					4.00
	Solvent	2.80		0.20		0.20	3.20
	Other	0.10	1.00	2.20	0.60	0.50	4.40
	Sub-total	43.20	36.70	50.10	25.60	25.60	181.20
Print run	Ink	11.70		45.22[a]	2.00		13.70
	Water						
	Extender						
	Solvent						
	Other						
	Other						
	Sub-total	11.70		45.22	2.00		58.92
Clean-up	Ink remaining	29.00	14.30	24.70	10.00	8.80	86.80
	Solution added	18.00	15.50	16.70	18.20	16.40	84.80
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed	20.50	18.60	19.80	21.90	19.60	100.40
Total ink used		23.40	19.30	67.52	13.90	13.60	137.72
Total excluding bearer bars		13.21	9.64	58.17	2.75	2.69	86.46

[a]estimated

Table 6-A.9 Ink and Additive Consumption for Water-based Ink on LDPE and PE/EVA at Site 2

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Makeready	Ink	21.00	19.00	22.50	21.60	21.60	105.70
	Water	2.50	2.00	1.00	1.00		6.50
	Extender						
	Solvent	0.50					0.50
	Other	0.70					0.70
	Sub-total	24.70	21.00	23.50	22.60	21.60	113.40
Print run	Ink		13.25	21.20			34.45
	Water	13.40	11.20	9.85	2.25	11.65	48.35
	Extender						
	Solvent		0.40	0.65			1.05
	Other		0.10	0.10	0.30	0.25	0.75
	Other		0.55	0.30		0.30	1.15
	Sub-total	13.40	25.50	32.10	2.55	12.20	85.75
Clean-up	Ink remaining	10.30	18.95	17.85	13.15	15.35	75.60
	Solution added			0.70			0.70
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed			1.60			1.60
Total ink used		27.80	27.55	36.85	12.00	18.45	122.65

[a]White ink was not printed on PE/EVA.

Table 6-A.10 Ink and Additive Consumption for Water-based Ink on LDPE and PE/EVA at Site 3

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Makeready	Ink	26.80	34.60	88.60	43.00	35.50	228.50
	Water			6.60			6.60
	Extender						
	Solvent	0.90				0.20	1.10
	Other	1.50	0.50	2.20	1.10		5.30
	Sub-total	29.20	35.10	97.40	44.10	35.70	241.50
Print run	Ink						
	Water						
	Extender			3.70			3.70
	Solvent	0.60		3.60		5.20	9.40
	Other	5.60	5.60	3.20	3.60		18.00
	Other	0.80	0.60				1.40
	Sub-total	7.00	6.20	10.50	3.60	5.20	32.50
Clean-up	Ink remaining	17.00	25.40	68.80	35.80	31.00	178.00
	Solution added	14.80	15.55[b]	3.50	13.40	14.35[b]	31.70
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed	14.65	15.40[b]	4.10	13.65	14.10[b]	32.40
Total ink used		19.35	15.90	38.50	11.65	9.90	95.30
Total excluding bearer bars		14.40	11.80	36.00	5.36	3.62	71.18

[a]White ink was not printed on PE/EVA.

[b]not included in calculation

Table 6-A.11 Ink and Additive Consumption for Water-based Ink on OPP at Site 4

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	35.20	45.00	45.90	42.40	41.40	209.90
	Water	0.80	0.80	0.80	0.80	0.80	4.00
	Extender			1.60			1.60
	Solvent						
	Other						
	Sub-total	36.00	45.80	48.30	43.20	42.20	215.50
Print run	Ink			43.00			43.00
	Water			0.80			0.80
	Extender			1.60			1.60
	Solvent	0.60	0.20				0.80
	Other		0.10				0.10
	Other						
	Sub-total	0.60	0.30	45.40	0.00	0.00	46.30
Clean-up	Ink remaining	19.20	31.00	31.60	34.00	32.20	148.00
	Solution added	32.40[a]	26.20[a]	20.40[a]	29.90[a]	23.10[a]	132.00
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed	36.20	29.90	23.10	32.40	26.20	147.80
Total ink used		13.60	11.40	59.40	6.70	6.90	98.00

[a]water

Table 6-A.12 Ink and Additive Consumption for Solvent-based Ink on LDPE and PE/EVA at Site 5

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Makeready	Ink	20.90	22.70	45.00	29.55	25.55	143.70
	Water						
	Extender						
	Solvent	2.01	2.01	2.25	2.01	2.00	10.28
	Other						
	Sub-total	22.91	24.71	47.25	31.56	27.55	153.98
Print run	Ink			8.25			8.25
	Water						
	Extender						
	Solvent	2.80		3.35	2.40		8.55
	Other						
	Other						
	Sub-total	2.80	0.00	11.60	2.40	0.00	16.80
Clean-up	Ink remaining	7.55	4.25	29.40	7.45	4.95	53.60
	Solution added						
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed						
Total ink used		18.16	20.46	29.45	26.51	22.60	117.18

[a]White ink was not printed on PE/EVA.

Table 6-A.13 Ink and Additive Consumption for UV-cured Ink on LDPE and PE/EVA at Site 6

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Makeready	Ink	37.65	36.50	50.70	25.00	35.65	185.50
	Water						
	Extender						
	Solvent						
	Other						
	Sub-total	37.65	36.50	50.70	25.00	35.65	185.50
Print run	Ink						
	Water						
	Extender						
	Solvent						
	Other						
	Other						
	Sub-total						
Clean-up	Ink remaining	28.80	31.90	30.31	21.35	29.90	142.26
	Solution added						
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed						
Total ink used		8.85	4.60	20.39	3.65	5.75	43.24

[a]White ink was not printed on PE/EVA.

Table 6-A.14 Ink and Additive Consumption for Solvent-based Ink on LDPE and PE/EVA at Site 7

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	27.90	24.85	47.40	25.90	25.25	151.30
	Water						
	Extender						
	Solvent						
	Other						
	Sub-total	27.90	24.85	47.40	25.90	25.25	151.30
Print run	Ink						
	Water						
	Extender						
	Solvent	20.00	20.00	22.30	18.60	18.60	99.50
	Other						
	Other						
	Sub-total	20.00	20.00	22.30	18.60	18.60	99.50
Clean-up	Ink remaining	25.00	22.40	22.50	25.50	19.70	115.10
	Solution added	11.23	11.23	11.23	11.23	11.23	56.15
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed	11.23	11.23	11.23	11.23	11.23	56.15
Total ink used		22.90	22.45	47.20	19.00	24.15	135.70

Table 6-A.15 Ink and Additive Consumption for UV-cured Ink on PE/EVA at Site 8

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White[a]	Cyan	Magenta	
Makeready	Ink	9.02	7.10	9.82	10.08	6.07	42.09
	Water						
	Extender						
	Solvent						
	Other						
	Sub-total	9.02	7.10	9.82	10.08	6.07	42.09
Print run	Ink						
	Water						
	Extender						
	Solvent						
	Other						
	Other						
	Sub-total						
Clean-up	Ink remaining	7.34	6.08	6.26	9.28	5.42	34.38
	Solution added						
	Ink scraped out						
	Ink wiped out						
	Ink and solution removed						
Total ink used		1.68	1.02	3.56	0.80	0.65	7.71

[a]White ink was not printed on PE/EVA.

Table 6-A.16 Ink and Additive Consumption for Water-based Ink on OPP at Site 9A

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	25.60	14.60	60.20	14.60	15.60	130.60
	Water			4.20			4.20
	Extender				4.60		4.60
	Solvent	4.60	2.00		3.60	1.20	11.40
	Other		0.10	0.10	0.10	0.10	0.40
	Sub-total	30.20	16.70	64.50	22.90	16.90	151.20
Print run	Ink						
	Water						
	Extender						
	Solvent						
	Other						
	Other	0.10					0.10
	Sub-total	0.10					0.10
Clean-up	Ink remaining	26.90	11.70	34.70	19.20	12.10	104.60
	Solution added	14.10[a]	14.10	26.10	14.20[a]	14.10	54.30
	Ink scraped out						
	Ink wiped out	0.20	1.20	2.50	0.40	1.40	5.70
	Ink and solution removed	13.80[a]	14.80	28.00	14.00[a]	15.00	57.80
Total ink used		3.20	3.10	25.40	3.30	2.50	37.50

[a]excluded from calculation

Table 6-A.17 Ink and Additive Consumption for Solvent-based Ink on OPP at Site 9B

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	10.80	12.20	74.40	10.00	9.20	116.60
	Water						
	Extender					4.00	4.00
	Solvent	2.80	5.80	1.00	2.30	4.60	16.50
	Other						
	Sub-total	13.60	18.00	75.40	12.30	17.80	137.10
Print run	Ink						
	Water						
	Extender						
	Solvent						
	Other						
	Other						
	Sub-total						
Clean-up	Ink remaining	5.54[a]	6.20	19.60	5.40	7.80	44.54
	Solution added	5.20	5.00	12.60	5.00	5.00	32.80
	Ink scraped out						
	Ink wiped out	1.00	2.00	4.20	0.40	1.60	9.20
	Ink and solution removed	6.20	7.20	16.40	5.40	6.60	41.80
Total ink used		6.06	7.60	47.80	6.10	6.80	74.36

[a]estimated

Table 6-A.18 Ink and Additive Consumption for Solvent-based Ink on OPP at Site 10

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	19.00	26.50	90.00	19.60	19.00	174.10
	Water						
	Extender						
	Solvent	16.20	7.20	15.30	6.50	11.50	56.70
	Other	1.80	0.80	1.70	7.00	2.50	13.80
	Sub-total	37.00	34.50	107.00	33.10	33.00	244.60
Print run	Ink	10.50	7.50		12.00	11.00	41.00
	Water						
	Extender						
	Solvent	4.95	15.30	30.15	6.00	15.50	71.90
	Other	0.55	1.70	3.35	9.50		15.10
	Other						
	Sub-total	16.00	24.50	33.50	27.50	26.50	128.00
Clean-up	Ink remaining	26.00	28.50	73.00	32.00	30.00	189.50
	Solution added	4.00	4.00	4.00	4.00	4.00	20.00
	Ink scraped out						
	Ink wiped out	2.00	2.00		2.00		6.00
	Ink and solution removed	4.00	4.00	4.00	4.00	4.00	20.00
Total ink used		25.00	28.50	67.50	26.60	29.50	177.10

Table 6-A.19 Ink and Additive Consumption for UV-cured Ink on LDPE at Site 11

Stage	Component	Line (lbs)			Process (lbs)		Total (lbs)
		Blue	Green	White	Cyan	Magenta	
Makeready	Ink	42.87	46.10	51.35	42.86	42.82	226.00
	Water						
	Extender						
	Solvent						
	Other						
	Sub-total	42.87	46.10	51.35	42.86	42.82	226.00
Print run	Ink						
	Water						
	Extender						
	Solvent						
	Other		1.00				1.00
	Other						
	Sub-total		1.00				1.00
Clean-up	Ink remaining	37.80	39.60	13.52	41.00	41.00	172.92
	Solution added	1.00[a]	1.00[a]	1.00[a]	1.00[a]	1.00[a]	0.00
	Ink scraped out						
	Ink wiped out		2.00				2.00
	Ink and solution removed						
Total ink used		5.07	5.50	37.83	1.86	1.82	52.08

[a]excluded from calculation

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Appendix 6-B (Energy Chapter)
Clean-Up and Waste Disposal Procedures for Each Site

Site 1

Use the pump to circulate water through the system for each color. After 10 minutes, pump clean water through once, without recirculating wipe down doctor blade with rag. Remove plastic liner from pan under doctor blade.

- Employees wear gloves.
- Rags handled by industrial laundry.
- Cleaning solution: water
- Ink is filtered; water sent to POTW and solids are incinerated.
- Annual costs: ~$30,000 for ink treatment and disposal costs
  $50,000 for solid/hazardous waste treatment and disposal

Retrofit: done internally — changed dryers to increase air flow; new higher anilox rolls. Do not recognize cost savings associated with using water-based inks. The cost is actually higher with lower press speeds and more complex color separations for process printing.

Site 2

Wipe out ink pans with water and alcohol mixture, pushing excess into drain. Scrape ink off of blade; wipe blade dampened with solution; scrape ink out of ink pan into drain; allow any ink/ink residue in pan to dry and scrape out later.

- Employees wear gloves.
- Rags handled by industrial laundry.
- Cleaning solution: water and alcohol
- Waste ink placed in waste drum and hauled away; off-site incineration.
- Annual costs: $10,000 for ink treatment and disposal costs (~40 drums @ $250/drum)
  $15,210 for solid/hazardous waste treatment and disposal

Retrofit: done internally — upgraded dryers to get more air flow through the ovens. Already had doctor blades that were sufficient. Operators trained on-the-job. It took 1½ years to switch all colors and get acceptable print quality. They didn't lose product, it was just their own internal standards.

Site 3

Flush system with ammonium and water blend. Wipe off remaining ink with towels soaked in the same blend.

- Employees wear gloves.
- Rags handled by industrial laundry.
- Collect waste ink/press clean-up water in containers for pick-up from waste hauler approximately four times a year. Hauler takes it to the incinerator.
- Nothing is discharged to sewer.
- Annual costs: $6,400 for ink treatment and disposal costs

Retrofit: done internally — they had a press that was previously used for solvent ink. They had to add a treater, increase the volume of the anilox rolls, and increase/improve the dryer capacity.

Site 4

Fill 5-gallon bucket half-way with water. Pump water from bucket through the white print station for 5 min. Stop pumping water. Wipe down anilox rolls, doctor blade with rag soaked in clean water. Move water bucket (now with white ink in it also) to the magenta station and repeat pumping followed by wiping process Reuse water bucket for green, cyan, and blue stations.

- Employees wear no personal protective equipment.
- Rags handled by industrial laundry.
- Water/ink mixture is shipped off-site for recovery and incineration; separates water and solids and incinerates the solids.
- Nothing is discharged to sewer.
- Annual costs: $15,390 for ink treatment and disposal costs

Retrofit: done internally — they upgraded a press that had been used for solvent-based inks by replacing the anilox rolls.

Site 5

Drain ink pans and scrape down. Flush with solvent, using 5 gallon sumps—four times—send to scrap. Some rags used for wiping. Sent to waste handling facility (cement kilns). Reutilize usable ink: 35% of ink issued is returned for reuse. Reclaim some of the solvent for in-house reuse.

- Employees wear recommended eye shields and gloves.
- Rags disposed of in landfill.
- Cleaning solution: solvent cleaning solution (n-propyl alcohol)

No retrofit.

Site 6

Solvent cleaning tank used for UV systems. Dry wipe with rags. Parts and rags are cleaned with spent, recycled solvent.

- Employees wear eye shields, gloves, and arm protectors.
- Rags washed in spent alcohol and then laundered for reuse.
- Cleaning solution: solvents; sent off-site to cement kilns.
- Nothing is discharged to sewer.

Retrofit done internally — UV lamps and power supplies; increased working capacity, web cleaner and pre-treater.

Site 7

Flush out with solvent; drain before laundry.

- Employees wear eye shields and gloves.
- Rags handled by industrial laundry.
- Cleaning solution: solvent; reused about three times, then sent out as hazardous waste.
- Nothing is discharged to sewer.
- Annual costs: $80 per job

No retrofit.

Site 8
Site 8 was a UV press manufacturer's demonstration press in Germany.

- Employees wear gloves.

Site 9A
Pump clean with water; wipe anilox with rag of cleaning blend; dispose of waste clean-up water; waste water disposed through waste hauler.

- Employees wear no personal protective equipment.
- Rags handled by industrial laundry.
- Cleaning solution: water; water/ NPA/ ammonia (80%/17%/3%)
- Press wash water-based ink; diluted then discharged to sewer/POTW.

Retrofit: done internally — improve drying oven and blowers.

Site 9B
Same as above except the cleaning solution is solvent (acetate [n-propyl] and alcohol [n-propyl]).

Site 10
In-house batch distillation. Solvent recaptured and reused (ink blend, cleaning). Thick pumpable still bottom goes to kiln for burning. Color wash: flush and wipe out; solvent goes to distiller; rags go to drain tank. Drain each color down. Pour 4 lbs solvent into chamber and circulate. Drain clean-up solvent down. Wipe out systems using five solvent soaked rags. 5-7 minutes each color.

- Employees wear eye shields and gloves.
- Rags handled by industrial laundry.
- Cleaning solution: solvent (blend made in-house); 100% reused until it loses its efficiency.
- Nothing is discharged to sewer.
- Annual costs: $8,000 for ink treatment/distillation
  $15,000 for waste disposal and transportation

No retrofit.

Site 11
Pump ink back to 5 gallon containers. Wipe excess ink off with rags.

- Employees wear eye shields, gloves, and apron.
- Rags handled by industrial laundry
- Cleaning solution: solvent (alcohol); after several cleanings, the dirty wash is run through the distilling unit. Solids are taken out.
- Nothing is discharged to sewer.
- Bulbs for UV lamps: $300 each
- Doctor blades: ~$300/month; $3,600 annually
- Ink cleaning equipment: distillation still purchased in 1992; ~ $30,000
- Ink cleaning supplies: ~$500/month; $6,000 annually

No retrofit: brand new machine.

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